

## **Marshall-Lerner Condition for South Asia: A Panel Study Analysis**

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### **Abstract**

Fluctuations in exchange rate have threatened the stability of global financial system and have invited unwarranted currency war. South Asia has been experiencing a whopping trade deficit from the last many years. This study is an attempt to analyze the impact of exchange rate depreciation on trade balance by estimating Marshall-Lerner condition for South Asian countries. This study used the panel data of seven South Asian countries consisting of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri-Lanka for the period of 1993 to 2010. The study used random effects model (REM) to estimate the import and export demand elasticity. The study used Hausman Specification test to make a choice between fixed effects model and random effects model. The study has also used Breusch-Pagan test to make a choice between random effect model and simple panel ordinary least square model. The study finds that sum of import and export demand elasticity is less than one for South Asian countries, M-L condition does not fulfill, and that is why no improvement in trade balance has been seen in response to exchange rate depreciation. Moreover, the results suggest that some relevant policies like, export promotion measures and industrialization of import substitution must be taken into consideration to improve the trade balance. The study also suggested some future research directions at the end.

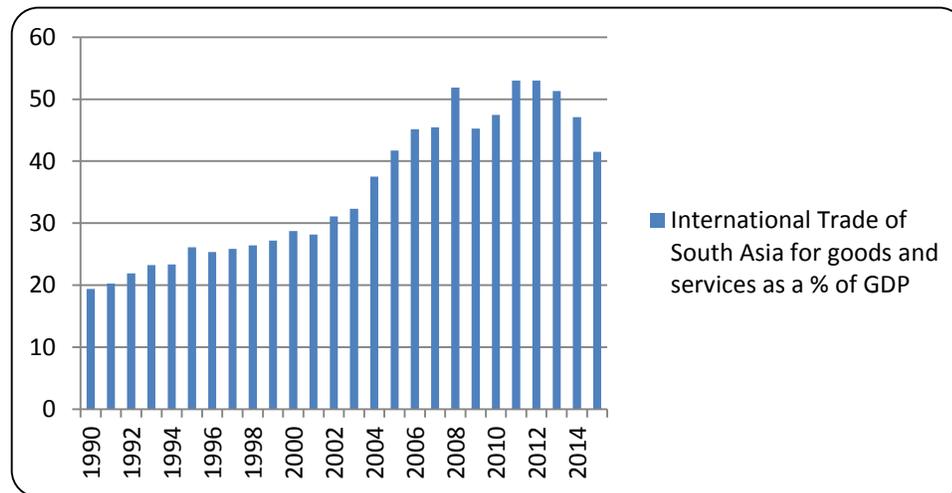
**Keywords:** Marshall-Lerner condition, exchange rate, trade balance, export and import demand elasticity, random effect model, south Asia.

### **1. Introduction**

A major macroeconomic policy action for a country facing deficit in her trade balance is said to be devaluation of its currency. Exchange rate policy is considered a powerful tool for the regulation of the external sector of the economy. Most of the developing countries face deficit in their trade balances which further cause the balance of payment problem for these countries. Exchange rate policy and deficit in the trade balance have always

been a continuous problem for developing economies. Most of the developing countries are facing deficit in their trade balance. These countries devalued their currencies many times with an aim to improve their trade balance. But question arises here is that, whether decrease in exchange rate of a country increases its balance of trade or not? To respond this question, most economists usually check the Marshall-Lerner condition. Marshall-Lerner condition hypothesizes that if the sum of imports and exports price elasticity is greater than unit then depreciation will improve the balance of trade otherwise not. This approach is also named as elasticity approach to the balance of payment.

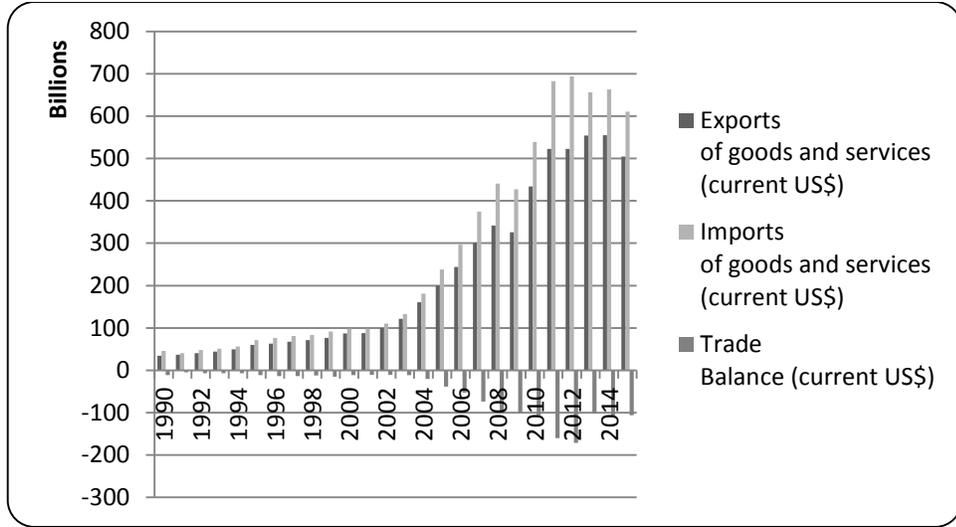
South Asia is one of the emerging regions who remained successful to achieving an average of 6.45 percent GDP growth rate and 5.1 GDP per capita growth rate in the last five years. India, Bangladesh and Bhutan have shown a relatively more significant improvement in GDP growth rate in the last decade. However, South Asia remained unlucky in a sense that merchandise exports growth rate fell by 14.5 percent in 2015 and increase by 0.7 percent in the last fiscal year. Imports growth rate also fell down by 11.5 percent in 2015 but still facing negative trade balance of \$182 billion in 2015 and an average of \$210 billion in the last five years. While local currency in terms of dollars is continuously depreciate for all countries in this region in the last five years. Moreover, the share of international trade into the total GDP has been continuously increased from 1990 when liberalization policies were started, and lift up a boom after starting 21<sup>st</sup> century. It can be observed in the following graph:



Data Source: World Development Indicators

**Figure 1: South Asia's Trade as a % of GDP**

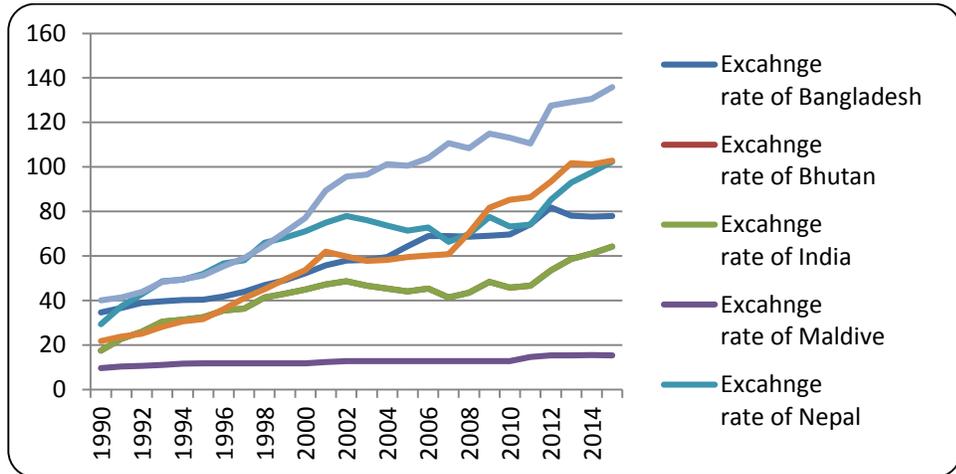
The figure 1 portrays a picture of trade as a percentage of GDP from 1990 to 2015. With the beginning of 21<sup>st</sup> century, the contribution of trade into GDP has been rising unanimously whatever the trade balance will be. The figure 2 snatched out the picture of trade balance of South Asia with the rest of the world from 1990 to 2015.



Data Source: World Development Indicators

**Figure 2: Trade Balance Performance of South Asia**

The figure 2 represents that trade balance of South Asia would always been adverse since the very beginning but with the start of a new journey as trade volume increased, trade balance would also be adverse more. Moreover, the local currency value for this region has declined continuously as shown in graph 3. Instead of continuously depreciation in currency, South Asian region failed to improve their trade balance.



Data Source: World Development Indicators

**Figure 3: Exchange Rate Performance of South Asian Countries**

If trade flows are very sensitive to relative prices in a significant manner, devaluation will reduce trade imbalances (Reinhart, 1995). Trade elasticity of G-7 countries have shown less response to meet with M-L condition in the short run but met in the long run (Hooper et al., 2000). The empirical estimation and both linear and nonlinear impulse response

functions show that M-L condition holds (Moura & Silva, 2005). Tochitskaya (2007) also examined that M-L condition is fulfilled and depreciation can pick up the balance of trade in the long run. Furthermore, Kakar et al. (2010) reported the positive significant impact of exchange rate depreciation on trade balance in case of Pakistan, consistent with M-L condition. Turkay (2014) estimated the M-L condition for Turkey and found the effectiveness of M-L condition only in the long run. Caporale et al. (2015) analyzed that M-L condition holds for Kenya and there exist a long run relationship between real exchange rate and trade balance.

In contrast, the earlier study of Rose (1991) documented that the M-L condition is not fulfilled in five OECD countries in the short run. Ahearn (2002) also found the extremely low trade elasticity parameters, which suggests that these elasticity are insufficient to satisfy the M-L condition for Southeast Asian countries. Real exchange rate depreciation pushes up exports for most of Asian economies but its impact on export growth is smaller (Fang, Lai & Miller, 2006). A very recent study by Cambazoglu & Gunes (2016) estimated the validity of M-L condition and found that depreciation didn't improve the trade balance of Turkey. Therefore, above mentioned studies have shown a contrasting picture on M-L condition.

Most of the developing countries in south Asia are facing deficit in their trade balance. Their payments to the rest of the world are greater than their receiving from the rest of the world. Moreover, in deficit balance of payment, the portion of the trade deficit is too large. To overcome this deficit, developing countries are financed by internal and external loans. Thus, we can predict that developing countries are caught up by this deficit circle. So, it is very important to find that how these developing countries can come out of this trap, how can they encourage their inflows and how can they improve their trade balance. For this purpose, M-L condition suggests that if the sum of trade elasticity is greater than one then devaluation will encourage the balance of trade otherwise not. Various studies like Brooks (1999), Hooy & Chan (2008), Ahearn (2002) estimated the import and export demand elasticity for this purpose. This study is different than previous studies because of using panel data analysis for South Asian countries instead of focusing on individual or bilateral country analysis.

M-L condition has been estimated many times during previous 70 years for the developing and developed countries as well. Most of the studies had reported evidence in favor of M-L condition therefore these countries were able to improve their trade balance by depreciating home currency as their elasticity of import and export were greater than one. On the other side of the same mirror, some studies found no evidence in favor of M-L condition. Numerous empirical studies have been found on trade elasticity for individual country analysis and for bilateral trade measures for south Asian countries separately. But, to the best of authors' knowledge, no empirical estimation is found as a regional analysis for this region. As countries belonging from to this region have the similar environment, trade commodities, currency depreciation etc. Further, these countries have also faced currency depreciation for a long period of time but improvement in trade balance has also not been seen. Therefore, it is necessary to find out that why consecutive depreciation has not improved the trade balance of south Asia. According to M-L condition, rise in the trade balance as a result of exchange rate depreciation is only possible if the import and export demand elasticity are greater than one. For this purpose, this study has estimated the import and export trade elasticity as

suggested by Marshall and Lerner by using panel data technique for the selected South Asian countries named as Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri-Lanka during the period 1990 to 2015. Afghanistan is not included due to the unavailability of data.

Rest of the study follows the following order: the very next section focuses relevant review of literature; section three discusses model specification and variable description. Section four elucidate empirical findings and their interpretation and section five is about concluding remarks and policy recommendations.

## **2. Review of Literature**

To the best of authors' knowledge, none of the study has been found on regional analysis regarding M-L condition. However, many studies estimated the M-L condition for countries on individual or bilateral trade basis. The first part of this section represents the review of literature relating to those studies that are in favor of fulfillment of M-L condition. Whereas second part of this section reveals the review of literature related to those studies that failed to satisfy M-L condition. End of this section is about summary of the contrasting views on the basis of existing literature to support the research gap.

### *2.1 Existence of M-L Condition*

Brooks (1999) empirically estimated the M-L condition for bilateral trade balance between US and G-7 countries by using the quarterly data for the period of 1973:I to 1996:II. The study used ADF and KPSS tests to find the stationarity of the data and then Johansen-Juselius FIML estimation method and Ordinary Least Square, Fully Modified Least Square, and Error Correction Model were applied. Moreover, the study also used CUSUM and CUSUMSQ stability tests. The results of the study indicate that US fulfills the M-L condition on bilateral trade with all G-7 countries except Canada. Therefore, the depreciation of dollar must improve the trade balance of US. However, this condition may be checked by overall trade with G-7 countries and/or with the rest of the world instead of bilateral trade.

Ahearn (2002) empirically analyzed the impact of currency depreciation on balance of trade of Southeast Asian countries, these countries include: Malaysia, Singapore, Philippines and Korea by using cointegration and ECM techniques. The empirical findings of the study show that exchange rate depreciation would not work for all countries. Philippines and Malaysia have improved their trade balance permanently, which means that only these countries satisfy M-L condition and have elasticity greater than one while Korea and Singapore would never improve their trade balance even in the long run and these countries estimations are exactly opposite to J-curve phenomenon.

Mohammad & Hussain (2010) scrutinized the association between trade balance and devaluation of real exchange rate in Pakistan by using dataset for the period of 1970 to 2008. The study used Augmented Dickey-Fuller test to check the stationarity of the data and Johansen-Juselius cointegration technique to check the long run relationship among concerned variables. The study has also used impulse response function to check the soundness of M-L condition and J-curve hypothesis. The empirical findings of the study suggest that real exchange rate depreciation improves balance of trade in Pakistan and findings of impulse response function are in favor of the validation of M-L condition and existence of J-curve phenomenon in Pakistan.

Hsing (2010) empirically investigated the M-L condition of the bilateral trade between the US and Hong Kong, India, Japan, Korea, Malaysia, Pakistan, Singapore and Thailand. For computing the real exchange rate, both the relative consumer price index (CPI) and producer price index (PPI) have been used. The empirical results of the study show that widely used log-log form is rejected for Singapore and Malaysia using either the relative CPI or PPI and is also inappropriate for India and Pakistan using the relative PPI.

Eita (2013) empirically estimated the M-L condition for Namibia by using cointegrated vector autoregression model for the period of 1991 to 2011. The research findings of the study indicate that increase in world income encourages exports while depreciation of exchange rate discourages exports. On the other hand, increase in domestic income and exchange rate appreciation both encourage imports. All the results are significant and M-L condition holds for Namibia.

Bano et al. (2014) estimated M-L condition for Pakistan by using ADF stationarity test and cointegration test for the period of 1980 to 2010. The study found long run relationship between the exchange rate and trade balance. Moreover M-L condition is hold in case of Pakistan economy; balance of trade will improve as a result of currency depreciation.

### *2.2 Non-Existence of M-L Condition*

Kulkarni (1996) investigated the impact of exchange rate devaluation on trade balance of Egypt and Ghana by using M-L condition and J-curve hypothesis. The study theoretically shows that successive devaluation results in a constant balance of payment deficit. Furthermore, the study concludes that a country that continues to devalue in the long run, may not improve the balance of payment. The findings of the study are just having theoretical base and not have any empirical estimation to justify their results.

Dash (2013) investigated the movement in the trade balance of India with her four major trading partners as a result of exchange rate devaluation in the short run as well as in the long run. The study used time series monthly data for the period of 1991:01 to 2005:06 on bilateral basis. The study used stationarity test to examine the time series properties and applied Johansen-Juselius multivariate cointegration approach. Moreover, the study used impulse response function and CUSUM test to estimate the shock and stability between the concerned variables, respectively. The empirical findings of the study show that M-L condition hold only in case of India-Germany trade while the J-curve phenomenon is appropriated only in case of India's trade with Japan and Germany on bilateral basis. On the other hand, no evidence has been found in favor of J-curve phenomenon in India's trade with US and UK. However, if the study used aggregation of data instead of bilateral basis then the results might be consistent with M-L condition and J-curve theory.

Bahmani et al. (2013) examines the literature of authors' owned studies on the confirmation of M-L condition for 29 countries. The study used results of previously published studies to confirm the holding of M-L condition. Moreover, the study also used ARDL approach to estimate the trade elasticity for M-L condition. The findings of the study postulate that M-L condition holds in some cases and not met in some cases. The study suggested that policy makers should form more effective policies to improve their trade activities.

Sek & Har (2014) empirically estimate the M-L condition to check that whether currency depreciation improves the trade balance or not. The study focused on bilateral trade between Malaysia and its major trading partners (China, EU, Japan, Singapore and U.S.). The paper used least square and fully modified least square method to estimate the separate model with each trading partner on bilateral basis for the period of 1980 to 2012. The study concluded that income of trading partners improves trade balance while domestic income would not contribute towards improvement in the trade balance. Moreover, the study found no validity of M-L condition on bilateral basis except with Malaysia-EU case.

Panda & Reddy (2016) investigated the trade relations between China and India under the umbrella of M-L condition and J-curve hypothesis. The study used bound test approach to apply ARDL and ECM to estimate the short run and long run relationship between domestic income, foreign income, trade balance and exchange rate by using the annual frequency data from 1987 to 2014. Bound test results reveal the long run relationship between the concerned variables, while results of ARDL and ECM model rejected the validity of M-L condition and J-curve phenomenon. Thus, the study concludes no improvement in trade balance of India with China in response to rupee depreciation.

The existing literature, on whether depreciation of currency improves the balance of trade or not by using M-L condition has shown two contrasting pictures. Some of existing literature presented above is related to our concerned countries but mostly related to other than South Asian countries. However, they have empirically estimated the same theory for different regions or sets of countries by using time series data estimation for each country on bilateral basis. The present study is an attempt to estimate the M-L condition for selected Asian countries by using panel data approach.

**3. Theoretical Framework**

The M-L condition is defined as the sum of imports and exports trade elasticity must be greater than 1 then depreciation of home currency will improve the trade balance. Following the work of Brooks (1999), the elasticity approach to the balance of payment is based on the research of Bickerdike (1906, 1920). The essential theoretical framework for the derivation of M-L condition is following.

The trade balance equation in terms of foreign currency units can be:

$$B_f = P_{fx}X - P_{fm}M \dots\dots\dots (1)$$

Depreciation causes the trade balance to change and that can be expressed as follows:

$$\Delta B_f = (P_{fx}\Delta X + X\Delta P_{fx}) - (P_{fm}\Delta M + M\Delta P_{fm}) \dots\dots\dots (2)$$

Suppose that value of exports and value of imports are following:

$$V_{fx} = P_{fx}X \dots\dots\dots (3)$$

$$V_{fm} = P_{fm}M \dots\dots\dots (4)$$

assuming foreign value of exports and foreign value of imports, respectively. By rearranging the equation (2) and putting the values of equation (3) and (4), equation 5 can be derived.

$$\Delta B_f = V_{fx} \left( \frac{\Delta X}{X} + \frac{\Delta P_{fx}}{P_{fx}} \right) + V_{fm} \left( -\frac{\Delta M}{M} - \frac{\Delta P_{fm}}{P_{fm}} \right) \dots\dots\dots (5)$$

The elasticity of supply for exports from the domestic country and the elasticity of supply of imports from the foreign country are given in equation (6) and (8) respectively. On the other hand, elasticity of demand for exports in the foreign country and elasticity of demand for imports in the domestic country are given in equation (7) and (9) respectively.

$$e_x = \frac{\frac{\Delta X}{X}}{\frac{\Delta P_{dx}}{P_{dx}}} \Rightarrow \text{domestic export elasticity of supply} \quad (6)$$

$$\eta_x = \frac{-\frac{\Delta X}{X}}{\frac{\Delta P_{fx}}{P_{fx}}} \Rightarrow \text{foreign export elasticity of demand} \quad (7)$$

$$e_m = \frac{\frac{\Delta M}{M}}{\frac{\Delta P_{fm}}{P_{fm}}} \Rightarrow \text{foreign import elasticity of supply} \quad (8)$$

$$\eta_m = \frac{-\frac{\Delta M}{M}}{\frac{\Delta P_{dm}}{P_{dm}}} \Rightarrow \text{domestic import elasticity of demand} \quad (9)$$

Foreign currency value in terms of domestic currency value is described by exchange rate ( $r$ ) between currencies. Therefore, we can write as

$$P_{fm} = P_{dm} \cdot r$$

It is assumed that the ratio of depreciation is very small. Therefore, from the above equations (6) to (9) of demand and supply elasticity, it is possible to write the equation for change in foreign currency value of the trade balance as:

$$\Delta B_f = V_{fx} \frac{\eta_x - 1}{1 + (\eta_x/e_x)} + V_{fm} \frac{\eta_m [1 + (1/e_m)]}{(\eta_m/e_m) + 1} \dots \dots \dots (10)$$

This equation is known as Bickerdike-Robinson-Metzler (BRM) condition. This equation (10) shows that trade balance in foreign currency units depends upon the supply elasticity of domestic exports and foreign imports, and demand elasticity of foreign exports and domestic imports. But another assumption of M-L condition is that supply elasticity of domestic exports and foreign imports are infinite. So, we can write equation (10) by putting supply elasticity term as infinite:

$$\Delta B_f = V_{fx}(\eta_x - 1) + V_{fm}(\eta_m) \dots \dots \dots (11)$$

If we start with initially trade balance, then value of exports in terms of foreign currency units will be equal to the value of imports in terms of foreign currency units. *i.e.*

$$V_{fx}/V_{fm} = 1$$

The trade balance in terms of foreign currency value will improve if export demand elasticity plus import demand elasticity is greater than one. *i.e.*

$$\eta_x + \eta_m > 1$$

This term is generally referred as M-L condition. The M-L condition is defined as if the sum of export and import demand elasticity is greater than one then depreciation in home currency improves the balance of trade.

Relaxing the assumption of initially trade balance will result in two cases:

First, when the initially trade balance is in surplus, value of exports in terms of foreign currency units is greater than value of imports in terms of foreign currency units. *i.e.*

$$V_{fx}/V_{fm} > 1$$

The trade balance will get better if the summation of demand elasticity for exports and “weighted” demand elasticity of imports is greater than one. *i.e.*

$$\eta_x + \frac{V_{fm}}{V_{fx}} \eta_m > 1$$

In case of surplus trade balance, M-L condition is not a sufficient condition.

In the second situation, if there is an initially deficit trade balance, value of exports in terms of foreign currency units will be lesser than the value of imports in terms of foreign currency units. *i.e.*

$$V_{fx}/V_{fm} < 1$$

Then depreciation will improve the trade balance only if

$$\eta_x + \frac{V_{fm}}{V_{fx}} \eta_m > 1$$

But the M-L condition becomes a satisfactory condition and not essential condition. When the country faces initially deficit in his trade balance, the M-L condition shows greater results in case of depreciation.

#### 4. Model Building

$$M_{iw} = f(Y_i, ER_{iw})$$

$$X_{iw} = f(Y^*, ER_{iw})$$

$M_{iw}$  and  $X_{iw}$  represents merchandise import of country  $i$  from the rest of the world and merchandise export of country  $i$  to the rest of the world respectively.  $Y_i$  and  $Y^*$  represents real GDP of country  $i$  and rest of the world GDP, respectively. Whereas,  $ER_{iw}$  is the official exchange rate of country  $i$  with rest of the world, *i.e.* US dollar. Official exchange rate is the nominal exchange rate and usually reported as: home currency is in number of units against per unit of dollar. The log linear representation of the import demand equation and export demand equation is following:

$$LM_{i,t} = \alpha_0 + \alpha_1 LY_{i,t} + \alpha_2 LREX_{i,t} + \varepsilon_{i,t} \dots \dots \dots (A)$$

$$LX_{i,t} = \alpha'_0 + \alpha'_1 LY^*_{i,t} + \alpha'_2 LREX_{i,t} + \varepsilon_{i,t} \dots \dots \dots (B)$$

Generally, currency depreciation decreases the costs of exports in foreign currency terms, that encourage exports, while it increases the costs of imports in domestic country, that discourages imports. The M-L condition deals with the import and export price elasticity

of demand, *i.e.* domestic price elasticity of demand for imports and foreign price elasticity of demand for exports. In above linear form of logarithm, equations A and B represents import and export elasticity of demand. It is expected that real depreciation of currency might cause decrease in imports and increase in exports. It also expect that income elasticity ( $\alpha_1$  &  $\alpha'_1$ ), to be positive, which postulates that an increase in income of  $i^{\text{th}}$  country might cause imports to rise and an increase in world's income might cause exports to rise. Therefore,  $\alpha_2$  and  $\alpha'_2$  have also positive expected signs. To simplify M-L condition, the study also assumes that supply elasticity are infinite (Brooks, 1999). Thus, the sum of import price elasticity and export price elasticity must be greater than one. In the above model, coefficients  $LREX_{it}$  should be greater than one. The mathematical expression can be written as  $|\alpha_2| + |\alpha'_2| > 1$ . If this condition is fulfilled, trade balance will improve in response to currency depreciation.

The annual data for Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri-Lanka has been composed for the period of 1990 to 2015. Afghanistan is not included in the panel due to unavailability of data. The liberalization policy for this region had been recommended in 1988 but adopted in 1990. Therefore, this study wants to capture the impact of currency depreciation on trade balance after liberalization. Further, this study used panel dataset of 26 years (1990 to 2015) for seven countries to analyze the import and export trade elasticity after liberalization policies in this region. Moreover, South Asia countries have showed significant improvement in the economic growth and trend towards international trade after 1990. This study also aims to capture the trend in international trade in response to currency depreciation after 1990. The data has been taken from World Development Indicators (WDI), International Monetary Fund (IMF) databases and Asian Development Bank.

#### 4.1 Econometric Model

The study has used random effects model (REM) to estimate the import and export trade elasticity for model A and B. REM has been used because there are too many intercept parameters in the fixed effects model (FEM) and the loss of degree of freedom can be avoided if the variations across cross-sections are assumed to be random. The random effects model is

$$Y_{it} = \alpha_{li} + \beta X_{it} + e_{it}$$

Unlike the FEM, which assumes that slope coefficients for all cross sections are constant and intercept parameters are considered to be fixed parameter which fluctuates along with each individual cross section entities but does not fluctuates over time, the REM supposes that the slope coefficients are constant for all cross-sections (Hill et al. 2011). It has also assumed that all the cross-section differences would be captured by the intercept parameters in FEM. But, in the REM all the cross-sections are selected randomly. Therefore, cross-section differences are treated as random rather than fixed.

The Hausman specification test is generally used to make selection between fixed and random effect models. The test compares the coefficient estimates of REM and FEM. Hausman test considered that both REM and FEM estimators are reliable if there is no correlation between  $\mu_i$  and the regressor  $X_{it}$ .

So, this can be written as:

$$Y_{it} = \alpha + \beta X_{it} + \gamma Z_i + f_i \mu_{it}$$

Where,

$Y_{it}$  = Regressand variable for entity  $i$  at time  $t$

$X_{it}$  = Time-variant independent variable

$Z_i$  = Time-invariant independent variable

$\mu_{it}$  = Error term

$f_i$  = Country specific characteristic like institutional, religious or historical factors in country level data

The null hypothesis here is that  $H_0: E(\mu_{it}/X_{it}) = 0$ . It consider that whether the unique error ( $\mu_i$ ) are correlated with regressor or not? In other words, the null hypothesis is that  $H_0$ : REM is appropriate than alternative hypothesis  $H_1$ : REM is not appropriate. If errors are correlated with the regressor ( $H_0$ is rejected), FEM is suitable while random effects model gives biased results. On the other side, if errors are not correlated with the regressor, we failed to reject  $H_0$ , REM is more efficient model and produced more consistent results.

Breusch-Pagan (1980) Lagrange Multiplier (LM) test statistic has been estimated to check the presence of REM, which is as following:

$$LM = \frac{NT}{2(T-1)} \left\{ \frac{\sum_{i=1}^N \left( \sum_{t=1}^T \hat{e}_{it} \right)^2}{\sum_{i=1}^N \sum_{t=1}^T \hat{e}_{it}^2} - 1 \right\}$$

In this case the null hypothesis in the LM test is that variance across cross-sections is zero, *i.e.*  $H_0: \sigma_{\mu}^2 = 0$  against the alternative hypothesis that variance across cross-sections is greater than zero, *i.e.*  $H_1: \sigma_{\mu}^2 > 0$ . If the null hypothesis is true then we can conclude that random effects do not exist. Therefore, no need to apply FEM or REM, we should just apply simple OLS regression. On the other hand, if the null hypothesis is rejected and accept the alternative hypothesis, then we can conclude that random effects exist.

#### 4.2 Empirical Estimations

The empirical results of Hausman Specification test for model A and B are reported in table 1 and 2 respectively. The null hypothesis of Hausman test is that difference in coefficients is not systematic against the alternative hypothesis of fixed effects (Green, 2008). Basically, Hausman test is Chi-Square based test. It shows Chi-Square statistics, Chi-Square degree of freedom and probability.

**Table 1: Hausman Specification Test Results (Model A)**

Correlated Random Effects - Hausman Test				
Test cross-section random effects				
Null Hypothesis Ho: difference in coefficients not systematic				
<b>Coefficients</b>	<b>(b)</b>	<b>(B)</b>	<b>(b-B)</b>	<b>sqrt(diag(V-b-V-B))</b>
	<b>FE</b>	<b>RE</b>	<b>Difference</b>	<b>S.E.</b>
<b>LY</b>	1.15761	1.00420	0.15341	0.01969
<b>LER</b>	-0.01284	0.18051	-0.19335	0.02419

**Table 2: Hausman Specification Test Results (Model B)**

Correlated Random Effects - Hausman Test				
Test cross-section random effects				
Null Hypothesis Ho: difference in coefficients not systematic				
<b>Coefficients</b>	<b>(b)</b>	<b>(B)</b>	<b>(b-B)</b>	<b>sqrt(diag(V-b-V-B))</b>
	<b>FE</b>	<b>RE</b>	<b>Difference</b>	<b>S.E.</b>
<b>LY*</b>	1.98387	1.97764	0.00623	0.00709
<b>LER</b>	-0.30008	-0.29061	-0.00947	2.42705

Note: Hausman Specification test has been used in the selection of the fixed effects or random effects model.

The estimated results of Hausman specification test predict that we are failed to reject null hypothesis. Thus, difference in coefficients is not systematic and random effects models are appropriate for both models.

In REM, it is assumed that the variations across entities are random. It is also assumed that the variations across entities are uncorrelated with the independent variables. The random effect estimation results for model A and B are expressed in the following table 3 and 4 respectively.

**Table 3: Random Effects GLS Estimation Results (Model A)**

Dependent Variable: LM			
<b>Independent Variables</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>Prob.</b>
<b>Constant</b>	-0.847	0.267	0.002
<b>LY</b>	1.004	0.033	0.000
<b>LER</b>	0.181	0.080	0.023
R <sup>2</sup> = 0.93, Wald chi2(2) = 2090.52, Prob. > chi2 = 0.000			

**Table 4: Random Effects GLS Estimation Results (Model B)**

Dependent Variable: Lx			
Independent Variables	Coefficient	Std. Error	Prob.
Constant	-16.861	1.130	0.000
Ly*	1.978	0.095	0.000
Ler	-0.291	0.121	0.016
R <sup>2</sup> = 0.87, Wald Chi2(2) = 1202.54, Prob. > Chi2 = 0.000			

Note: Empirical model is being estimated by using Stata11. Probability values shows that all the variables are highly significant. The values are rounded off to three decimal points. Wald chi2 represents overall significance of the model.

The import and export trade elasticity are estimated through random effects model for South Asian countries as a regional analysis. The study used the logarithm models to estimate the import and export elasticity. The estimation results of the model A show that domestic income and exchange rate has significant and positive impact on imports of South Asian countries. Depreciating local currency will cause imports to rise and an appreciation will cause the imports to decline. Moreover, the estimated import elasticity of demand is 0.18 for this region which depicts that the demand for these imports items is price inelastic, because the predominant imports of this region consist of petroleum, petroleum products, capital goods and machinery that have been showing inelastic behavior. That's why imports are increasing despite of local currency depreciation. On the other side of the same mirror, the estimation results of model B shows that world income is highly significantly and positive related to exports. An increase in world income causes the exports to rise and vice versa, while the exchange rate has significant but negative relation to exports earnings. A depreciation of local currency will cause the exports to decline. Furthermore, the estimated export elasticity is 0.29.

Theoretical literature on the relationship between exchange rate and trade balance depict that exchange rate depreciation causes exports to become cheaper. So, rise in exchange rate causes imports to become more expensive. While the empirical results of present study postulate an opposing picture of that theoretical view discussed earlier. Major empirical justification for our findings is that the region failed to fulfill M-L condition, as the sum of export and import trade balance is less than one. That's why currency depreciation cannot lead to improve the trade balance. Moreover, major imports of this region are consisted of petroleum, petroleum products and machinery. Major exports consist of primary products. These results are consistent with Alam (2010), whose study found that there is no causality towards export growth in response to real exchange rate depreciation. The M-L condition hypothesize that the absolute sum of import and export elasticity must be greater than one, then depreciation of exchange rate will improve the balance of trade otherwise not. So, in present study estimated sum of both import and export elasticity is less than one which predicts that M-L condition does not fulfill in case of South Asian region and depreciation of currency will not improve the trade balance. Overall results of M-L condition for South Asian countries are conformed by Dash (2013) and Awan et al. (2012).

Breusch-Pagan Lagrange Multiplier test has been used to make a choice between random effects regression and simple ordinary least square regression (OLS). The empirical results of Breusch-Pagan test for model A and B are plugged in table 5 and 6 respectively.

**Table 5: The Breusch-Pagan Estimation Results (Model A)**

	<b>Var</b>	<b>Sd = sqrt(var)</b>
<b>Lnimp</b>	0.78673	0.88698
<b>e</b>	0.00905	0.09515
<b>U</b>	0.01118	0.10573
Test: var (u) = 0, Chi 2 (1) = 192.06, Prob > chi 2 = 0.0000		

**Table 6: The Breusch-Pagan Estimation Results (Model B)**

	<b>Var</b>	<b>Sd = sqrt(var)</b>
<b>Lnexpo</b>	0.80790	0.89883
<b>e</b>	0.01519	0.12325
<b>u</b>	0.87012	0.93280
Test: var (u) = 0, Chi 2 (1) = 2108.27, Prob > chi 2 = 0.0000		

Note: Breusch and Pagan Lagrangian multiplier test has been performed on Stata11 to make a choice between simple OLS and REM. The null hypothesis of “no random effect” is rejected in this estimation.

The null hypothesis of Breusch-Pagan test is that the variances across countries are zero (*i.e.* no random effect or no panel effect). The probabilities of both the models show that the null hypothesis is rejected with 100 percent confidence and conclude that random effects are appropriate. Thus, there is no evidence of any significant differences across countries. Therefore, the study used random effects regression instead of simple OLS regression.

## 5. Conclusion

This study is an attempt to analyze the impact of exchange rate depreciation on exports and imports of selected South Asian countries. Import and export trade elasticity has been calculated to evaluate that “Whether South Asia fulfill the M-L condition or not”. A recent trend has been made towards panel data study to analyze the impact of exchange rate fluctuations on import and exports of South Asian countries. As after 1990s, international trade is being considered as an engine of economic growth, this region has been failed to show significant improvement in trade balance as a result of continuous depreciation in local currency. So, it is important to investigate the M-L condition for this region, empirical findings of the study show that domestic and world income has significant positive impact on imports and exports respectively. Increase in domestic income would rise of exports. Increase in world income would cause rise in exports. This is according to the consumption behavior theory as presented by Keynes in 1936 which concludes that exchange rate has direct impacts on imports and indirect impact on exports. It means that exchange rate depreciation discourages exports and encourages

imports. These findings of the study are matched with the findings of Eita (2013) in case of Namibia and empirical findings of the present study also justified by Shahzad (2013), who found no evidence of the long run relationship between exchange rate depreciation and trade balance for South Asian countries. While some other studies like Bano et al. (2013), and Mohammad & Hussain (2010) postulate that M-L condition holds for Pakistan and depreciation will improve the trade balance. But, present study has shown controversial picture. To illustrate this controversial situation, the study incorporates the import and export trade elasticity. The sum of import and export trade elasticity is 0.47 which is less than one and depicts that this region failed to fulfill M-L condition to improve their trade balance. Therefore, the study concludes that South Asian region will improve their trade balance as a result of currency depreciation only if the sum of import and export trade elasticity is greater than one.

The demand elasticity of imports and exports depend crucially on export and import commodities of region. The predominant exports of South Asia are primary goods, manufacture goods and non-oil commodities, while the predominant imports are petroleum, petroleum products, capital goods and machinery. These imported items have lack of range of substitutes. So, the demand for these imported items is price inelastic that is why this region failed to reduce imports even as a result of local currency depreciation. Moreover, these import items become more expensive as a result of domestic currency depreciation and domestic country has to pay more foreign exchange for the purchase of these items. Thus, we can conclude that this region failed to satisfy M-L condition.

#### *5.2 Policy Recommendations, Limitations and Future Research Directions*

For policy makers, it is suggested that firstly this region must fulfill the M-L condition then depreciation will improve the trade balance otherwise the phenomenon of exchange rate depreciation to improve trade balance would not work. A real depreciation can improve the trade balance by raising the return on export commodities. So, this region can enhance their return on export commodities, if demand for these commodities is price inelastic. Mostly export production does not meet with exports demand and also failed to compete in international market. Therefore, it is also suggested that export promotion measures and as well as import substitution industrialization must be taken into consideration to improve trade balance. However, there are some limitations in the present study. The same model can be enhanced to find out the existence of J-curve phenomena in this region. By increasing the trend of global economic integration, international trade is being considered an engine of economic growth; the model of present study might be used to forecast the future trade position of South Asian countries. Moreover, structural breaks and non-linearities could also be examined in the context of fractional integration.

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